Pre-Calc Name________________________________ ID: 1

Polynomials D4 HW- All work separate sheet.

Date________________ Period____

Divide.

1) $(r^5 + 4r^4 - 4r^3 - 4r^2 - 4r - 2) \div (r - 1)$

2) $(2k^5 + 4k^4 - 2k^3 - 14k^2 - 18k - 26) \div (2k - 4)$

Factor each completely.

3) $64x^3 + 32x^2 - 40x - 20$

4) $240n^3 - 40n^2 - 210n + 35$

Factor each completely. Use the sum/difference of cubes formulas.

5) $-64x^3 - 125$

6) $27x^3 - 8$

Factor each completely.

7) $3x^4 + 30x^2 + 63$

8) $15m^4 + 20m^2 - 75$

9) $30u^4 + 35u^2 - 100$

State the possible rational zeros for each function. Then factor each and find all zeros.

10) $f(x) = 2x^3 - 19x^2 + 41x - 15$

11) $f(x) = 9x^5 + 6x^4 + 84x^3 + 56x^2 + 27x + 18$

12) $f(x) = 3x^5 + 15x^4 + 8x^3 + 40x^2 + 5x + 25$

13) $f(x) = 25x^5 + 5x^4 + 30x^3 + 6x^2 + 5x + 1$

Describe the end behavior of each function.

14) $f(x) = -x^2 - 2$

15) $f(x) = -2x^2 - 8x - 7$

16) $f(x) = x^5 - 3x^3 + 2x + 3$

17) $f(x) = x^3 + 11x^2 + 40x + 49$

Answers to Polynomials D4 HW- All work separate sheet. (ID: 1)

1) $r^4 + 5r^3 + r^2 - 3r - 7 - \dfrac{9}{r-1}$

2) $k^4 + 4k^3 + 7k^2 + 7k + 5 - \dfrac{3}{k-2}$

3) $4(8x^2 - 5)(2x + 1)$

4) $5(8n^2 - 7)(6n - 1)$

5) $(-4x - 5)(16x^2 - 20x + 25)$

6) $(3x - 2)(9x^2 + 6x + 4)$

7) $3(x^2 + 3)(x^2 + 7)$

8) $5(3m^2 - 5)(m^2 + 3)$

9) $5(2u^2 + 5)(3u^2 - 4)$

10) Possible rational zeros:
$\pm 1, \pm 3, \pm 5, \pm 15, \pm \dfrac{1}{2}, \pm \dfrac{3}{2}, \pm \dfrac{5}{2}, \pm \dfrac{15}{2}$
Factors to: $f(x) = (2x - 5)(x^2 - 7x + 3)$
Zeros: $\left\{\dfrac{5}{2}, \dfrac{7 + \sqrt{37}}{2}, \dfrac{7 - \sqrt{37}}{2}\right\}$

11) Possible rational zeros:
$\pm 1, \pm 2, \pm 3, \pm 6, \pm 9, \pm 18, \pm \dfrac{1}{3}, \pm \dfrac{2}{3}, \pm \dfrac{1}{9}, \pm \dfrac{2}{9}$
Factors to: $f(x) = (3x + 2)(3x^2 + 1)(x^2 + 9)$
Zeros: $\left\{-\dfrac{2}{3}, \dfrac{i\sqrt{3}}{3}, -\dfrac{i\sqrt{3}}{3}, 3i, -3i\right\}$

12) Possible rational zeros:
$\pm 1, \pm 5, \pm 25, \pm \dfrac{1}{3}, \pm \dfrac{5}{3}, \pm \dfrac{25}{3}$
Factors to: $f(x) = (x + 5)(3x^2 + 5)(x^2 + 1)$
Zeros: $\left\{-5, \dfrac{i\sqrt{15}}{3}, -\dfrac{i\sqrt{15}}{3}, i, -i\right\}$

13) Possible rational zeros: $\pm 1, \pm \dfrac{1}{5}, \pm \dfrac{1}{25}$
Factors to: $f(x) = (5x + 1)(x^2 + 1)(5x^2 + 1)$
Zeros: $\left\{-\dfrac{1}{5}, i, -i, \dfrac{i\sqrt{5}}{5}, -\dfrac{i\sqrt{5}}{5}\right\}$

14) $f(x) \to -\infty$ as $x \to -\infty$
$f(x) \to -\infty$ as $x \to +\infty$

15) $f(x) \to -\infty$ as $x \to -\infty$
$f(x) \to -\infty$ as $x \to +\infty$

16) $f(x) \to -\infty$ as $x \to -\infty$
$f(x) \to +\infty$ as $x \to +\infty$

17) $f(x) \to -\infty$ as $x \to -\infty$
$f(x) \to +\infty$ as $x \to +\infty$